

Claims

1. An imager assembly for a miniature camera head, comprising the following components:

- a) an imaging sensor having conductive leads emanating from two opposite sides of said sensor, for outputting and/or inputting electric signals and/or power;
- b) an objective lens system placed on top of said sensor;
- c) circuitry, mounted beneath said imaging sensor, for driving said sensor and amplifying said electrical signals, where the components of said circuitry are electrically linked, according to the circuit requirements, to each other and to said sensor leads by conductive wires;
- d) conductive wires electrically linked to said circuitry and to the leads of the imaging sensor for conducting electrical signals between the electrical circuitry and a remote location; and
- e) conductive wires electrically linked to said circuitry and to the leads of said imaging sensor to provide them with electrical power from an external power supply

wherein: said conductive leads are bent and said circuitry and said conductive wires are arranged and mounted such that the dimensions in a plane parallel to the sensor plane of said camera head are approximately equal to or less than the dimensions in the plane of said sensor; said

circuitry is capable of delivering signals produced by said imaging sensor for further processing; and the components of said imager, except for the imaging surface of the sensor and said objective lens system, are encapsulated by an isolating material.

2. An imager according to claim 1, wherein the electrical components of the circuitry are lined-up behind the imaging sensor.
3. An imager according to claim 1, wherein the imaging sensor is a CCD sensor.
4. An imager according to claim 3, wherein the CCD sensor is part of a TAB imager package.
5. An imager according to claim 1, wherein the imaging sensor is a CMOS sensor.
6. An imager according to claim 1, wherein the circuitry includes amplification, resistive, capacitance, and conductive components for electrically linking the components of said circuitry.
7. An imager according to claim 6, wherein the amplification component is an amplifier.

8. An imager according to claim 6, wherein the resistive components are embedded into the conducting wires used for linking the circuitry components.
9. An imager according to claim 8, wherein the resistive components are burn-resistors.
10. An imager according to claim 6, wherein the capacitance components are embedded into the conducting wires used for linking the circuitry components.
11. An imager according to claim 1, wherein the electrical circuitry further comprises a power source and a transmitter capable of wirelessly delivering the electrical signals produced by said circuitry and the imaging sensor to a remote location for processing.
12. An imager according to claim 1, further comprising a power supply wherein the circuitry and the imaging sensor are not linked by power supply wires to an external power source.
13. An imager according to claim 1 wherein the imager components, the encapsulating material, and the conducting wires have heat resistant

characteristics enabling said imager to remain undamaged and the quality of the images it produces to be essentially unaffected by repeated autoclaving procedures.

14. An imager according to claim 1, wherein the circuitry comprises an ASIC circuit.

15. An imager according to claim 1, wherein the circuitry and imaging sensor comprise a single ASIC unit.

16. An imager assembly for a miniature camera head according to claim 1, further comprising a plate, having dimensions in the plane parallel to the sensor plane that are equivalent to, or smaller than, the corresponding dimensions of the sensor and located beneath said sensor in an overlapping manner,

wherein said plate includes grooves located at opposite edges at locations corresponding to the conductive leads; the circuitry is mounted on the bottom side of said plate; said circuitry includes electrical connection points for electrically linking it to said sensor via said leads and additional electrical connection points for connecting transmission and power supply wires to deliver the amplified signal; and said leads are connected to said connection points via said grooves such that the dimensions of said camera

head in the plane parallel to the sensor plane are approximately equal to or less than the corresponding dimensions of said sensor.

17. An imager according to claim 16, wherein the CCD sensor is part of a TAB imager package and the protective strips of said TAB imager package are bonded to the bottom side of the plate.
18. An imager assembly for a miniature camera head according to claim 16, further comprising a second plate, having dimensions in the plane parallel to the sensor plane approximately equal to, or smaller than, the corresponding dimensions of the sensor and located in a parallel plane directly beneath the first plate in an overlapping manner, wherein the circuitry for driving said sensor and amplifying said electrical signals comprises two portions, a first portion which is mounted on the bottom side of the first plate and a second portion which is mounted on the top side of said second plate such that said first and said second portions face each other and said first portion includes electrical connection points for electrically linking it to said sensor via said leads and to said second portion via conductive wires linked to said second portion.
19. An imager according to claim 16 or 18, wherein the plate is a Printed Circuit Board (PCB).

20. An imager according to claim 19, wherein the PCB is made of ceramic or a special polymer material, withstands high temperature, and has a thermal expansion coefficient similar to that of the sensor.
21. An imager according to claim 18, further comprising electrical connection points situated on the bottom side of the second plate for connecting transmission lines to deliver the amplified signal.
22. An imager according to claims 18, wherein the second plate further comprises bores for connecting transmission lines passing through said bores directly to the electrical connection points of the first circuitry portion located on the first plate.
23. An imager according to claim 18, wherein one portion of the circuitry is mounted on the bottom side of the second plate and electrically linked to the other portion of said circuitry via conductive wires passing through bores in said second plate.
24. An imager according to claim 18, further comprising one or more additional plates, each of which having dimensions in the plane parallel to the sensor plane approximately equal to, or smaller than, the corresponding dimensions of said sensor, and located in parallel planes directly beneath the second plate in an overlapping manner, wherein each of said additional

plates comprise portions of the circuitry mounted on the top and/or the bottom side of said additional plates said portions of circuitry being electrically linked by transmission lines.

25. An imaging system for processing and displaying images acquired by an imager according to claim 1, comprising:

- a) a signal generator capable of providing voltage signals via the conductive wires for driving the imaging sensor to obtain acquisition rates of at least 100 fields per second;
- b) circuitry for separately extracting each line of the acquired fields that are received from the imager;
- c) circuitry for outputting a continuous display rate of at least 100 full-frames per second by combining the lines of the previously read field with the lines of the currently read fields; and
- d) a display system capable of displaying the outputted image in a continuous and non-interlaced mode, wherein the circuitry for extracting each line of the acquired fields separately prevents line summation during field readout thereby improving image quality and the dynamic response obtained by the imaging sensor.

26. An imaging system according to claim 25, wherein the display system is capable of displaying images in VGA synchronization standard.

27. A method for improving the image quality and the dynamic response obtained by a CCD imaging sensor, comprising:
 - a) providing voltage signals for driving the said sensor to obtain an acquisition rate of at least 100 fields per second;
 - b) extracting each line of the acquired fields separately for preventing line summation during field readout;
 - c) outputting a continuous display rate of at least 100 full-frames per second by combining the lines of the previously read field with the lines of the currently read field; and
 - d) displaying the outputted image in a continuous and non-interlaced mode.
28. A method according to claim 27, wherein the images are displayed utilizing VGA synchronization standard.
29. An imager assembly for a miniature camera head substantially as described and illustrated.